SEWAGE EFFLUENT TESTKIT

Free and Total Chlorine, Turbidity, Permanganate value, pH, E-coli, Suspended solids, BOD, COD & TOC values and Temperature

MARINE CARE

MARINE CARE BV
Mozartlaan 3
3144 NA Maassluis
The Netherlands
T. +31 (0)10 2950342
F. +31 (0)10 2950345
E. supply@marinecare.nl
W. www.marinecare.nl

HEALTH & SAFETY

Some reagents required for tests shown in this booklet are classed as hazardous and as such, a minimum protection of gloves (rubber or plastic) and safety goggles/ spectacles or facemask **MUST BE WORN**.

In addition please note and observe the Risk and Safety phrases on each reagent container and follow handling guidelines as instructed.

GENERAL NOTES

⇒ Avoid contact with skin or eyes

⇒ In case of contact with skin or eyes rinse immediately with plenty of running tap water, and seek medical attention

⇒ Seek attention if irritation persists

⇒ In case of ingestion, wash the mouth out thoroughly with water, try to vomit and seek medical attention

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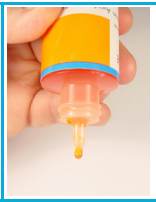
DROP TEST METHOD

The test should take between 10 and 30 drops of titrant to reach the end point. If number of drops is outside this range, adjust the sample volume used. i.e. < 10 drops used, increase sample volume or > 30 drops, reduce sample volume.

Rinse titration vessels with the sample to be tested or de-ionised or distilled water.

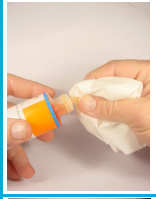
1

Hold dropper bottles vertically upside down and not inclined at an angle.



2

Allow drops to form slowly and fall off under their own weight.

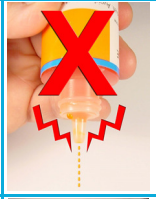


3

Keep dropper nozzles clean by wiping with a soft cloth or tissue. Especially remove encrustation caused by reagents drying out on the bottle tip.

4

Do not shake drops off.



5

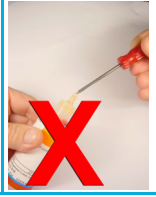
Ensure droppers are not statically charged. An indication of this is a rapid stream of very small drops with no proper control of drop formation.

6

Apply gentle pressure to the bottle walls to encourage drop formation if necessary.

7

Re-place the dropper cap immedi-ately after use to prevent cross contamination.



8

Never adjust the dropper tip aperture by inserting anything that may enlarge the opening or dam-age the restrictor. If the dropper tip becomes damaged, replace.

9

Use syringes provided to obtain accurate sample volumes. Do not rely on the graduations on the titration vessels, which are for rough guidance only.

FREE **CHLORINE** (0 - 30 mg/l)

Note: Test should be carried out immediately on fresh samples. If adding chlorine in an intermittent dose, wait 10 - 15 minutes after dosing before sampling and testing. This does not apply to systems using continuous dosing equipment.

Take sample according to expected range	Add **6 drops of FCL1**	Add "X" drops of **FCl 2** Count the drops	Until colour changes to **blue / green**
			

Colours may vary depending on sample and test conditions

Free Chlorine (mg/l) = "X" drops of FCl2 x Factor

Expected range	Sample range	Factor
FCL2		
1 - 4	40 ml	0,25
2 - 8	20 ml	0,5
5 - 15	10 ml*	**1**
10 - 30	5 ml*	2

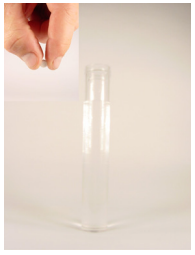
*Dilute samples of less than 20 mm to 20 ml with de-ionized or distilled water

FREE & TOTAL **CHLORINE** (0 - 1 mg/l)

Note:

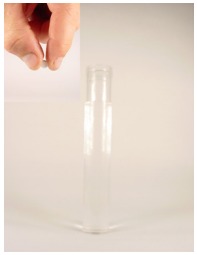
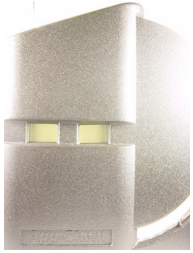
1. Take care not to shake or aerate the sample
2. Store the reagents in a cool and dry place

mg/l = ppm

Fill one (1) tube with **10 ml** of sample. Place in the left side of the comperator	Add one **DPD N0.1 tablet** to the order tube containing a small amount of the sample	Fill the tube to the **10 ml mark** fit the cap and mix thoroughly Place in right side Of comparator	Rotate the disc until colour match is obtained Record disc reading of **Free Chlorine**	Take the right hand tube from the comparator Add one (1) **DPD N0.3 tablet** fit the cap and mix thoroughly Place in right side Of comparator	Rotate the disc until colour match is obtained Record disc reading of **Total Chlorine**
					

Combined Chlorine in mg/l or ppm = Total Chlorine - Free Chlorine

pH (4 - 10)

Fill both tubes with **10 ml** of sample. Place in the left side of the comparator	Add one **Universal pH tablet** to the order tube fit the cap and mix thoroughly	Place in right side Of comparator	Rotate the disc until colour match is obtained Record disc reading of **pH**
			

pH is disc reading

PERMANGANATE VALUE

- This test is a simplified version of the standard AO test for indicating the general quality of final effluents. The test enables the Permanganate Value (PV) to be determined and the effluent classified as to its acceptability for discharge.

1. Take three (3) sample jars and fill each to the 100 ml mark with sewage effluent
2. Add two (2) Acidifying SE tablets to each jar, mount the cap and shake to the tablets disintegrate
3. To the first, second and third jars, add respectively 1, 2 and 3 Permanganate Value tablets. Mount all three caps and shake until the tablets are dissolved
4. Wait for 30 minutes, then note how many jars have remained pink. Read the results from the below stated table

JARS PINK COLOURED	PERMANGANATE VALUE	GRADING
All Three	0 - 10	Excellent
Two	10 - 20	Satisfactory
One	20 - 30	Dubious
None	Over 30	Unsatisfactory

- When testing crude sewage, add 10 ml sample to each jar and make up to 100 ml mark with de-ionized or distilled water. Proceed with the test as described above the multiply the Permanganate Value by 10.
- When testing settled sewage, add 20 ml sample to each jar and make up to 100 ml mark with de-ionized or distilled water. Proceed with the test as described above the multiply the Permanganate Value by 10.

BOD, COD AND TOC

It is possible to derive an indication of Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and Total Organic Carbon (TOC) from the result of the Permanganate Value test. This is based on the relationship between these measures of organic pollution obtained experimentally for domestic sewage and effluents.

To convert the Permanganate Value (PV) for doestic sewage and effluent to probable BOD,COD and TOC values multiply by the following factors:

	SEWAGE	EFFLUENT
Probable BOD	PV x 5	PV x 1,5
Probable COD	PV x 10	PV x 7
Probable TOC	PV x 3	PV x 2

Turbidity and Suspended Solids

The turbidity test is designed to give a measure of the suspended solids content of the final effluent. It is also useful in following the day to day variation in the quality of sewage and effluent.

The Palintest Turbidity Test uses a specially calibrated plastic tube.
This provides the simplest possible method of performing this important test.

1. Hold the tube vertically over a white surface and view downwards
2. Gradually pour in effluent sample until the black cross is just no longer visible
3. Read off the graduation corresponding to the height of the sample. This represents the turbidity of the effluent in Jackson Turbidity units (JTU). For sewage effluents the gradations may also be taken as being approximately equivalent to the Suspended Solids Content as mg/l or ppm

The Royal Commission Standards for effluents recommends that the suspended solids contents of sewage effluent should not exceed 30 mg/l

Note:
The tube should be rinsed after use. Any staining may be removed by the use of a household detergent.

E-coli Hygicult® E/ß-GUR

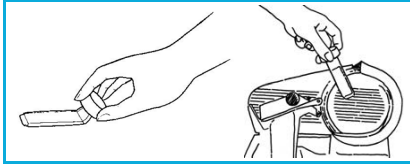
Hygicult E/ß-GUR slides are intended for presumptive detection of bacteria belonging to the family Enterobacteriaceae and for identifi cation of species producing ß-glucuronidase enzyme. The slide is covered on one side with modifi ed VRB Agar (Violet Red Bile Agar with addition of glucose) which allows bacteria belonging to Enterobacteriaceae to grow as red colonies.
The glucose also allows some other species to grow as red colonies. The other side of the slide is covered with colourless ß-Gur Agar. Species producing ß-glucuronidase are able to grow on this side as brown colonies. The test can be performed on-site for monitoring different types of materials, both solid and liquid. As required, the slides can be used as convenient transport media for samples.
Note: The limit values for microbial count in normal drinking water are too low to be detected by the Hygicult method.

Sampling

To avoid contamination, the growth medium should not come into contact with any other material than the one to be tested. On the other hand, it is important that the growth medium makes full contact with the material to be tested. After sampling screw the slide tightly back into the tube.

Contact inoculation (Fig. 1a, 1b)

Solid surfaces can be tested by pressing each side of the slide firmly against the surface for three or four seconds. The slide should be held still during pressing.

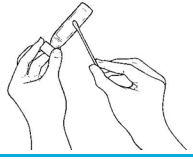


Dipping (Fig. 2)

Fluid samples are tested by dipping the slide in the liquid for three or four seconds. Blot the last drops on absorbent paper.

Swabbing (Fig. 3)

Semisolid materials or objects that are diffi cult to reach can be tested by carefully rolling a sterile swab over an area delimited using e.g. a frame. If the object is dry, the swab should first be moistened with sterile water. The moistened swab can also be used for obtaining samples from powders(e.g. spices) or viscous fluids.After swabbing the sample area, roll the swab gently over the agar surfaces of the slide from left to right and from bottom to top.



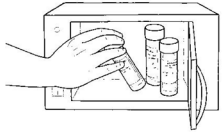
E-coli Hygicult® E/ß-GUR

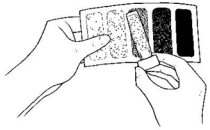
Incubation (Fig. 4)

Incubate the slide tightly enclosed in its tube at 35…37oC for 24–48 hours.

Interpretation of results (Fig. 5)

Remove the slide from its tube after incubation and determine the microbial count (number of colony forming units, CFU) and examine the colour reactions by comparing with the model chart. Bacteria belonging to Enterobacteriaceae grow on the modifi ed VRB Agar as red colonies. The glucose also allows some other gram-negative bacteria, e.g. Pseudomonas species, to grow as red colonies. ß-glucuronidase-positive organisms grow on β-GUR agar as colonies in various shades of brown. As the colouration may be weak for some strains at high densities (106–7 CFU/ml), any shade of brown is indicative of ß-glucuronidase-positive growth. ß-glucuronidase activity is found in ca. 90 % of strains of Escherichia coli. Some species of Salmonella, Edwardsiella, Shigella and Yersinia are also ß-glucuronidase producers. Gram-negative strains without ß-glucuronidase activity grow as colourless colonies on this agar. The growth of gram-positive organisms is inhibited on both media. The following levels can be considered as a rough basis for evaluating the degree of contamination:





Clean	0	CFU/side
Contaminated	1 - 10	CFU/side
Very contaminated	> 10	CFU/side

Warnings and precautions

Do not use product beyond the expiry date marked on the kit.
Do not use the kit if you notice

- discoloration or dehydration of the growth medium
- detachment of the growth media from the plastic slide
- evidence of bacterial or fungal growth

Do not touch the growth because any colony growing on the slide may be pathogenic.

Limitations of the method

When used as a contact slide, Hygicult E/ß-GUR equals the contact plate method in sensitivity, whereas the dip and swab procedures have a detection limit of 1000 CFU/ml. The allowed total microbial concentration of normal drinking water is too low to be reliably detected using Hygicult E/ß-GUR. Results obtained with different inoculation systems should not be compared. Valid comparisons can only be made among results obtained using the same technique on the same type of material.

Storage

Store the kit at room temperature (approx. 20 °C) protected from draught, temperature fluctuations and light sources. Avoid storage near heat-generating appliances. Do not allow to freeze. The expiry date (year-month-date) is marked on the box and on the cap of each slide.

Partslist Sewage Effluent Testkit		11915
Description	Amount	Article number
Permanganate Value test		
Acidifying SE, 100 tablets	2	11947
Permanganate Value, 100 tablets	2	11948
Test jar, 100 ml	3	11990
Free Chlorine 0 - 30 mg/l		
Reagent FCL1	1	11950
Reagent FCL2	1	11951
Syringe 20 ml	1	11980
Test bottle 50 ml	1	11991
Free Chlorine 0 - 1 mg/l		
Reagent DPD1, 100 tablets	1	11940
Reagent DPD3, 100 tablets	1	11941
Tablet crusher	1	11992
Test tube square10 ml, with lid	2	11993
Comparator	1	11994
Chlorine Disc 0 - 1 mg/l	1	11995

Partslist Sewage Effluent Testkit		11915
Description	Amount	Article number
pH 4 - 10		
Universal pH, 100 tablets	1	11954
E-Coli Hygicult E/ß-GUR 68267		
Test slides 10 ea.	1	11958
Labels 10 ea.	1	11959
Turbidity and Suspended Solids		
Test Tube scale 5 - 25	1	11997
Test Tube cale 30 - 500	1	11998
Temperature probe 0 - 100 ˚C	1	11999

WHEN IN DOUBT

⇒ Contact us for advise
⇒ E-mail us all test figures over a period of at least 3 months

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